

**What is claimed is:**

1           1. A method for use in watermarking a video signal, the method comprising the  
2 steps of:  
3           replicating at least selected ones of bits of additional information to be impressed  
4 upon a video signal by placing said bits into at least one selected bit of an average value  
5 of a chrominance portion over a block of said video signal; and  
6           supplying said original and replicated bits to be impressed in the same block  
7 position in successive frames.

1           2. The invention as defined in claim 1 wherein said block position is based on said  
2 video signal having one Y, one U and one V value for every 2x2 block of full resolution  
3 of an original input video signal.

1           3. The invention as defined in claim 1 wherein all of said bits of additional  
2 information that are to be impressed on a first one of said successive frames are replicated  
3 to be impressed on at least a second one of said successive frames that is for display  
4 without any frame being displayed between said first frame and said second ones of said  
5 successive frames.

1  
1           4. The invention as defined in claim 1 further comprising the step of adding an  
2 offset bias to an average value of a chrominance portion of at least one block of at least  
3 one frame of said successive frames that have said original and replicated bits impressed  
4 upon them in the same block positions.

1  
1           5. The invention as defined in claim 4 wherein said offset bias is independent of a  
2 busyness measure of said block.

1  
1           6. The invention as defined in claim 4 wherein said offset bias is independent of  
2 any value added to said average value to bring said average value within a safe range.

1

1           7. The invention as defined in claim 4 wherein said offset bias is a first offset bias  
2 that is a positive value added to a first one of said successive frames, and wherein said  
3 method further comprises the step of adding a second offset bias to an average value of a  
4 chrominance portion of at least one block of at least a second frame of said successive  
5 frames that have said original and replicated bits impressed upon them in the same block  
6 positions, said second offset bias being a negative value.

1  
1           8. The invention as defined in claim 4 wherein said offset bias is a first offset bias  
2 that is a positive value added to a first one of said successive frames, and wherein said  
3 method further comprises the step of adding a second offset bias to an average value of a  
4 chrominance portion of at least one block of at least a second frame of said successive  
5 frames that have said original and replicated bits impressed upon them in the same block  
6 positions, said second offset bias being a negative value and said at least one block of  
7 said at least second frame being like-positioned within said at least second frame as said  
8 at least one block of said first frame.

1  
1           9. The invention as defined in claim 4 wherein said offset bias is small relative to  
2 the change required in said average value to place said bits into said at least one selected  
3 bit of an average value.

1  
1           10. The invention as defined in claim 4 wherein additions are made to the  
2 chrominance portion of ones of the pixels of said at least one block until total of such  
3 additions equals the product of said offset bias and the number of pixels in a block, said  
4 additions being independent of any other changes made to the chrominance portion of  
5 said ones of the pixels.

1           11. The invention as defined in claim 1 further comprising the step of including a  
2 prescribed data sequence within said additional information to be impressed upon a  
3 chrominance portion of said video signal.

1           12. The invention as defined in claim 11 wherein said prescribed data sequence is  
2 known to a receiver of said video signal after it is watermarked.

1           13. The invention as defined in claim 11 wherein said prescribed data sequence is  
2 a Barker sequence.

1           14. The invention as defined in claim 11 wherein said prescribed data sequence is  
2 impressed, at least in part, upon prescribed blocks of at least one frame of said video  
3 signal.

1           15. The invention as defined in claim 11 wherein said prescribed data sequence is  
2 impressed in its entirety upon prescribed blocks of one frame of said video signal.

1           16. The invention as defined in claim 11 wherein said prescribed data sequence is  
2 impressed upon like-positioned prescribed blocks of multiple ones of frames of said  
3 video signal.

1           17. The invention as defined in claim 11 wherein replicas of said prescribed data  
2 sequence in its entirety are impressed upon like-positioned prescribed blocks of  
3 respective ones of multiple frames of said video signal.

1           18. The invention as defined in claim 1 further comprising the step of including a  
2 known data sequence within said additional information to be impressed upon a  
3 chrominance portion of said video signal, wherein said known data sequence is  
4 intermixed among said additional information so as to be scattered among the blocks of a  
5 frame.

1           19. The invention as defined in claim 1 further comprising the step of including a  
2 known data sequence within said additional information to be impressed upon a  
3 chrominance portion of said video signal, wherein said known data sequence is  
4 intermixed among said additional information so as to be scattered among the blocks of a  
5 frame, said scattering being different for different suppliers of said additional  
6 information.

1           20. A method for use with a receiver of a video signal containing additional  
2 information impressed upon a chrominance portion of said video signal, the method  
3 comprising the step of:

4           combining extracted initial additional information of like block positions from  
5 prescribed frames to determine the final additional information;  
6           supplying as an output said final additional information.

1           21. The invention as defined in claim 20 wherein said prescribed frames are  
2 successive frames.

1           22. The invention as defined in claim 20 wherein said prescribed frames are  
2 successive frames as transmitted in said video signal.

1           23. The invention as defined in claim 20 wherein said prescribed frames are  
2 successive frames when displayed.

1           24. The invention as defined in claim 20 further comprising the step of  
2 determining a quality of each of said prescribed frames that are combined in said  
3 combining step; and

4           wherein in said combining step said initial additional information of like block  
5 positions from said prescribed frames is combined as a function of said determined  
6 quality for each of said prescribed frames.

1           25. The invention as defined in claim 21 wherein said determined quality for each  
2 of said frames is a function of the number of errors in each of said frames for a known  
3 data sequence which is embedded in expected ones of the blocks of each of said frames.

1           26. The invention as defined in claim 21 wherein when said determined quality  
2 for a frame is below a prescribed threshold, said frame is treated as if it contains no  
3 additional information.

1           27. The invention as defined in claim 21 wherein said determined quality is  
2 expressed as a weight value, one weight value being developed for each frame.

1           28. The invention as defined in claim 21 wherein said final additional  
2 information is supplied to a channel decoder which treats said final additional  
3 information as soft bits.

1           29. Apparatus for use in watermarking a video signal, comprising:  
2 means for replicating at least selected ones of bits of additional information to be  
3 impressed upon a video signal by replacing a selected bit of an average value of a  
4 chrominance portion over a block of said video signal; and  
5 means for supplying said original and replicated bits to be impressed in the same  
6 block position in successive frames.

1  
1           30. A method for use in watermarking a video signal, the method comprising the  
2 steps of:  
3 inserting in prescribed block positions of prescribed frames of said video signal at  
4 least one unique identifying code by replacing a selected bit of an average of a  
5 chrominance portion over said blocks.

1  
1           31. The invention as defined in claim 30 wherein said identifying code is a  
2 Barker sequence.

1  
1           32. The invention as defined in claim 30 wherein said prescribed code identifies  
2 said prescribed frames as belonging to a unitary sequence.

1  
1           33. The invention as defined in claim 30 wherein said prescribed code identifies  
2 said prescribed frames as belonging to a unitary sequence, and said method further  
3 comprising the step of:  
4 inserting in other prescribed block positions of said prescribed frames at least one  
5 secondary unique identifying code by replacing a selected bit of an average of a  
6 chrominance portion over said blocks.

1  
1 34. The invention as defined in claim 33 wherein said at least one secondary  
2 unique identifying code is made up of a series of codes that distinctly identifies individual  
3 frames of said prescribed frames.

1  
1 35. The invention as defined in claim 33 wherein said at least one secondary  
2 unique identifying code is made up of a series of codes that distinctly identifies groups of  
3 frames of said prescribed frames, at least one of said groups of frames including a  
4 plurality of frames.

1  
1 36. A receiver for extracting additional information from a video signal  
2 containing said non-video information impressed upon a chrominance portion of said  
3 video signal, comprising  
4 an extractor for extracting said non-video information from said video signal; and  
5 a sequence processor receiving at least said extracted non-video information and  
6 detecting at least one prescribed sequence that was impressed upon at least one frame of  
7 said video signal

1  
1 37. The invention as defined in claim 36 wherein said sequence processor  
2 determines a number of errors in said at least one prescribed sequence for each of a  
3 plurality of grouped frames, said receiver further comprising:  
4 a frame weighting unit which uses a per-frame quality measure derived as a  
5 function of said number of errors in each of said plurality of frames to combine extracted  
6 like-block positioned non-video information from said plurality of frames into an output  
7 value for said block position for said grouped frames.

1           38. The invention as defined in claim 36 wherein said sequence processor  
2 determines a number of errors in said at least one prescribed sequence for each of a  
3 plurality of grouped frames, said receiver further comprising:  
4           a frame weighting unit which uses a per-frame quality measure derived as a  
5 function of said number of errors in each of said plurality of frames to combine extracted  
6 like-block positioned non-video information from said plurality of frames into a soft data  
7 output value for said block position for said grouped frames; and  
8           a channel decoder for decoding said soft values.